

WHAT IS CLAIMED IS:

1. A method of enhancing an input digital image having color features comprising:

5 converting said input digital image to a binary image of first and second type pixels such that pixels of said input digital image that define said color features are substantially converted to said first type pixels of said binary image;

10 changing the resolution of said binary image to derive a modified binary image; and

selectively inserting colors into pixels of said modified binary image to produce an output digital image having modified color features that differ in resolution with said color features of said input digital image.

15 2. The method of claim 1 wherein said step of converting said input digital image to said binary image includes comparing color components of said input digital image with predefined thresholds to classify said pixels of said input digital image as either said first type pixels or said second type pixels of said binary image.

20 3. The method of claim 2 wherein said step of comparing said color components of said input digital image includes classifying said pixels of said input digital image having at least a single color component that exceeds a corresponding predefined threshold as said first type pixels.

25 4. The method of claim 1 wherein said step of converting said input digital image to said binary image includes dividing said pixels of said input digital image into first and second groups based on color differences of said pixels of said input digital image.

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5. The method of claim 4 wherein said step of converting said input digital image to said binary image further includes converting said pixels of said input digital image that belong to a smaller group of said first and second groups to said first type pixels of said binary image and converting
5 said pixels of said input digital image that belong to a larger group of said first and second groups to said second type pixels of said binary image.

6. The method of claim 1 wherein said step of selectively inserting said colors into said pixels of said modified binary image includes inserting
10 only colors from said input digital image into said pixels of said modified binary image.

7. The method of claim 6 wherein said step of selectively inserting said colors into said pixels of said modified binary image includes:

15 comparing a particular pixel of said modified binary image with a corresponding pixel of said binary image;
determining whether said particular pixel of said modified binary image substantially matches said corresponding pixel of said binary image; and
20 inserting the color of a pixel of said input digital image from which said corresponding pixel of said binary image was derived into said particular pixel.

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8. The method of claim 7 wherein said selectively inserting said colors into said pixels of said modified binary image further includes:

comparing said particular pixel of said modified binary image with neighboring pixels of said corresponding pixel of said binary image in a predefined sequence, if said particular pixel and said corresponding pixel do not substantially match; and

inserting the color of a pixel of said input digital image that corresponds to a specific pixel selected from said neighboring pixels of said binary image that substantially matches said particular pixel of said modified binary image into said particular pixel, said specific pixel being a selected pixel of said neighboring pixels in said predefined sequence that substantially matches said particular pixel of said modified binary image.

9. The method of claim 1 wherein said step of changing the resolution of said binary image includes scaling said binary image to a higher resolution binary image and smoothing edges of features of said higher resolution binary image that correspond to said color features of said input digital image, said scaling and smoothing being performed using a template matching technique.

10. A system for enhancing an input digital image having color features comprising:

means for converting said input digital image to a binary image of first and second type pixels such that pixels of said input digital image that define said color features are substantially converted to said first type pixels of said binary image;

means for changing the resolution of said binary image to derive a modified binary image; and

means for selectively inserting colors into pixels of said modified binary image to produce an output digital image having modified color features that differ in resolution with said color features of said input digital image.

11. The system of claim 10 wherein said converting means is configured to compare color components of said input digital image with predefined thresholds to classify said pixels of said input digital image as either said first type pixels or said second type pixels of said binary image.

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12. The system of claim 10 wherein said converting means is configured to divide said pixels of said input digital image into first and second groups based on color differences of said pixels of said input digital image.

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13. The system of claim 12 wherein said converting means is further configured to convert said pixels of said input digital image that belong to a smaller group of said first and second group to said first type pixels of said binary image and to convert said pixels of said input digital image that belong to a larger group of said first and second groups to said second type pixels of said binary image.

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14. The system of claim 10 wherein said selectively inserting means is configured to execute a plurality of steps comprising:

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comparing a particular pixel of said modified binary image with a corresponding pixel of said binary image;
determining whether said particular pixel of said modified binary image substantially matches said corresponding pixel of said binary image; and

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inserting the color of a pixel of said input digital image from which said corresponding pixel of said binary image was derived into said particular pixel.

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15. The system of claim 14 wherein said selectively inserting means is further configured to execute steps comprising:

comparing said particular pixel of said modified binary image with neighboring pixels of said corresponding pixel of said binary image in

- 5 a predefined sequence, if said particular pixel and said corresponding pixel do not substantially match; and

inserting the color of a pixel of said input digital image that corresponds to a specific pixel selected from said neighboring pixels of

said binary image that substantially matches said particular pixel of said

- 10 modified binary image into said particular pixel, said specific pixel being a selected pixel of said neighboring pixels in said predefined sequence that substantially matches said particular pixel of said modified binary image.

16. A method of enhancing an input digital image having color features

- 15 comprising:

converting said input digital image to a binary image of first and second type pixels such that pixels of said input digital image that belong to said color features are substantially converted to said first type pixels of said binary image;

- 20 scaling said binary image to derive a modified binary image, including enhancing binary features of said modified binary image that represent said color features of said input digital image; and

selectively inserting colors into said pixels of said modified binary image, said colors being derived from original colors of said input

- 25 digital image.

17. The method of claim 16 wherein said step of converting said input digital image to said binary image includes determining whether any color component of said input digital image exceeds a predefined threshold,

- 30 said determination being used to classify said pixels of said input digital image as either said first type pixels or said second type pixels of said binary image.

18. The method of claim 16 wherein said step of converting said input digital image to said binary image includes separating said pixels of said input digital image to first and second groups based on spatial locations of said pixels of said input digital image on a color space.

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19. The method of claim 18 wherein said step of converting said input digital image to said binary image further includes converting said pixels of said input digital image that belong to a smaller group of said first and second groups to said first type pixels of said binary image and converting said pixels of said input digital image that belong to a larger group of said first and second groups to said second type pixels of said binary image.

10 20. The method of claim 16 wherein said step of selectively inserting said colors into said pixels of said modified binary image includes:

15 comparing a particular pixel of said modified binary image with a corresponding pixel of said binary image;
determining whether said particular pixel of said modified binary image matches said corresponding pixel of said binary image with respect to pixel values; and

20 inserting the color of a pixel of said input digital image from which said corresponding pixel of said binary image was derived into said particular pixel.

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21. The method of claim 20 wherein said selectively inserting said colors into said pixels of said modified binary image further includes:

comparing said particular pixel of said modified binary image with neighboring pixels of said corresponding pixel of said binary image in

- 5 a predefined sequence, if said particular pixel and said corresponding pixel do not match; and

inserting the color of a pixel of said input digital image that corresponds to a specific pixel selected from said neighboring pixels of said binary image that matches said particular pixel of said modified binary
10 image into said particular pixel, said specific pixel being a selected pixel of said neighboring pixels in said predefined sequence that matches said particular pixel of said modified binary image.

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